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ABSTRACT

This study used community contextual variables to investigate adolescent academic achievement, examining school districts and individual schools with 8th grade students. The first analyses were conducted for school year 1997-98. The school district model was replicated for 1996-97. Data came from the Department of Health and Human Services, Bureau of the Census, and Virginia Departments of Education and Health and Human Services. The study employed community social disorganization theory to explain variations in academic achievement as measured by standardized tests. It utilized structural equation modeling to reduce biased parameter estimates and investigate relationships between community contextual variables and determine whether contextual variables influenced academic achievement. The first structural equation model of the school district for 1997-98 accounted for 68 percent of the variance in adolescent academic achievement. When replicating the model for 1996-97, it accounted for 75 percent of the variance in academic achievement. When contextual variables at the school level were modeled, 65 percent of the variance was accounted for. Community social disorientation theory explained a significant amount of variance in academic achievement. The strongest variable throughout the analyses was student eligibility for free and reduced lunch, at both the school and district level. (Contains 31 references.) (SM)

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Running Head: Adolescent Academic Achievement

Community Social Disorganization Theory Applied to Adolescent Academic Achievement

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Community Social Disorganization Theory

Applied to Adolescent Academic Achievement

Abstract

Over the years, the public education system has been transformed by outside political and societal forces to provide an equal opportunity for all students. Investigations of the public education system were not consistent and yielded divergent results on how to improve adolescent academic achievement. These divergent results were caused by different operationalizations of variables, data analytical procedures that possibly provided biased parameter estimates, and a failure to use a comprehensive theory. Although these results were inconsistent, the latest transformation of the public education system currently involves holding schools, administrators, parents, and students accountable for learning.

The measurement of success in adolescent academic achievement was reflected by the results of standardized tests. Throughout the relevant literature, a strong link can be found between adolescent development, adolescent academic achievement, and adolescent social deviancy. In past and current research, the community social disorganization theory was used to explain variance in adolescent social deviancy.

The purpose of this study was conducting explanatory research using community contextual variables to investigate adolescent academic achievement. This study employed community social disorganization theory to explain variations in adolescent academic achievement as measured by standardized tests. In addition to employing theory, this dissertation utilized structural equation modeling to reduce biased parameter estimates and to investigate the relationships between community contextual variables. These procedures

were also used to determine whether contextual variables at the school level or the school district level influenced adolescent academic achievement and which was more significant.

The first structural equation model of the school district for school year 1997-98 accounted for 68% of the variance in adolescent academic achievement. This model was replicated on a different school year and it accounted for 75% of the variance in adolescent academic achievement. Next, contextual variables at the school level were modeled and 65% of the variance was accounted for.

These strong models hold great promise for investigating adolescent academic achievement using the community social disorganization theory along with appropriate statistical methods of structural equation modeling and multilevel analyses. The multilevel analyses must be replicated with future data to provide confirmation and support of the current results.

Community Social Disorganization Theory

Applied to Adolescent Academic Achievement

Introduction

Purpose: This study used modeling of community social disorganization theory to explain variation in adolescent academic achievement for policy makers at both the school district level and the school building level.

Theoretical Perspective: The perception that the public education system has failed to meet academic standards has demanded the attention of numerous practitioners, policy makers, and parents for the major portion of the 1900's, but especially the last 50 years (Bracey, 1995). This attention has focused on diverse issues including the equality of education opportunity for all students (Coleman et al., 1966), racial matters (Fisher, 1990; Kozol, 1991; Mayer, 1991; Orfield & Yun, 1999), funding adequacy (Hanushek, 1978, 1986, 1989; Payne & Biddle, 1999), the economic future of the nation (The National Commission on Excellence in Education, 1983), national standards for all students (Ravitch, 1983), and most recently a national movement toward state standards and school level accountability. These inquiries have reported divergent results and have not lead to a clear policy on district level development or educational resource allocation as had originally been intended (Hanushek, 1989). Furthermore, these approaches to educational reform have been criticized for failing to use theory to guide the investigations or draw inferences or interpretations from the results of data analyses. Dating back to the Coleman Report (Coleman et al., 1966), this failure to base investigations on theory was due to the nonexistence of a comprehensive theory regarding academic achievement (Pedhazur, 1982) and insufficient employment of more

complex means of data analysis. Pedhazur (1997) cited that "some researchers (e.g., Coleman, 1970) justified the use of crude analytic approaches on the grounds that the state of theory in the social sciences is rudimentary, at best, and does not warrant the use of more sophisticated analytic approaches" (p. 334). Recent reports (Baker, McGee et al., 1999; Baker, Robinson et al., 2000; Brooks-Gunn et al., 1993; Coll et al., 1996; Duncan et al., 1994; Mayer, 1991; Sampson, 1997) have provided new impetus for using the community social disorganization theory to investigate community ecological and individual factors affecting social deviancy to include cognitive development, juvenile delinquency, teenage pregnancies, and low birth weights. These studies led to a resurgent focus on community development as a means of reducing social deviancy (U. S. Department of Housing and Urban Development, 1999: U. S. Department of Justice, 1998a, 1998b, 1999).

Specific Aims: This present study sought to explain adolescent academic achievement at the levels of schools and school districts through the use of community social disorganization theory with the use of structural equation modeling data analyses techniques.

Procedures

Sample: The units of analyses were the school district and the school building that have 8th grade students. Within the Commonwealth of Virginia, there were 132 school districts and 379 school buildings. For these analyses, 128 school districts and 338 school buildings were used based on complete data and statistical multivariate outliers. The first analyses for the school districts and school buildings were conducted for the school year 1997-98. The school district model was replicated for the school year 1996-

97 with 127 school districts. These school districts and school buildings varied in demographics and socioeconomic status.

Methods: Existing data were gathered from the U. S. Department of Health and Human Services, Bureau of the Census and Virginia Departments of Education (VDOE) and Health and Human Services (VDHHS). Common method variance was reduced because of the several sources for the data. Based on sample size, the hypothesized models were as parsimonious as possible. The data analyses employed statistical methods of structural equation modeling. Analysis of Moment Structures (AMOS) 4.01 statistical package with maximum likelihood estimation was used to conduct the data analyses. A priori, theoretical models were established based on the community social disorganization theory and the reviewed literature. Data for each of the analyses were collected at the level of the specific model. No inferences were drawn for levels below or above the specific analysis. Based on available data, the school district model was replicated for the school year 1996-97. Data for the school year 1996-97 for the school building was not available.

School District Model: Two latent variables, Economic Condition and Children's Environment, were used as indicators of the school district's Social Organization. Indicators of the latent variable Economic Condition consisted of Student SES, as measured by the percentage of school students eligible for free or reduced lunch program, Children in Poverty, as measured by the percentage of children in poverty ages 5-17, and Unemployment, as measured by the unemployment rate. Indicators of the latent variable Children's Environment consisted of Graduation Percentage, a quasi- measure of residential mobility and school district's promotion policy as measured by the percentage

of entering freshman cohort as graduating seniors, Single-headed Household, a measure of community quality and economics as measured by the percentage of single-headed households in the school district, Infant Mortality, a measure of health services provided as measured by the infant mortality rate, and Teenage Pregnancy, another measure of health services and community quality as measured by the teenage pregnancy rate. The concepts of economic status, residential mobility, community quality, and health services are used throughout the literature with the community social disorganization theory and possibly have a combined influence of academic achievement. The endogenous variable of Academic Achievement consisted of the aggregated mean scores on three subtests of the Stanford 9 TA norm-referenced standardized achievement test. The three subtests used were Reading, Language, and Mathematics. Based on the Stanford 9 intended use, the K-R20 coefficients were in the acceptable range of the mid .80s to .90s. These tests were actually taken for the school year 1997-98 by the 8th grade class cohort in the Fall of 1998. These same variables were used during the replication of the model for school year 1996-97. Based on timing of collection, the same data were used for the indicator variables of Children in Poverty, Unemployment, and Single-headed Households.

School Building Model: This model represents a typical regression model where the observed variables of School Dropout Rate, Economic Condition, and Census Location predict the latent variable, Academic Achievement. School Dropout Rate was a measure of school policies to include promotions and student deviant behavior. Economic Condition was a measure of socioeconomic status of the school and was measured by the percentage of students eligible for free and reduced lunch program. School Dropout Rate and Economic Condition were allowed to covary. Census Location was a measure of

urbanicity versus rural areas to include population density and was measured by the U. S. Census identification with 1 as a large metropolitan place and 7 as a rural area. The latent variable of Academic Achievement consisted of the school building mean scores on the criterion-referenced battery of assessments to measure the Virginia Standards of Learning. The battery of tests was a combined English Writing and English Reading/Literature scores, History score, Science score, and Mathematics score. VDOE (1999) reported high content validity, high criterion validity, and acceptable reliability for the tests. The reliability using K-R20 values ranged from a low of .82 for English Writing to a .92 for Mathematics.

Results

School District Model: The School District Model for school year 1997-98 was an impressive good fit to the data and warranted further investigation. The chi-square was not statistically significant at the .01 level but was at the .05 level. The ratio of chi square to degrees of freedom was below 2 and the root mean square error of approximation (RMSEA) was .068 with a confidence interval 0f .028 to .102. The Tucker Lewis Index (TLI) and Comparative Fit Index (CFI) values, .994 and .996 respectively, were indicators of excellent fit of the model to the data. The distribution of the standardized residuals covariance matrix was symmetrical and centered on 0. No standardized residual exceeded 2.0 in absolute magnitude. The standardized root mean residual (SRMR) was .040. All of the parameter estimates were statistically significant. This School District Model was replicated for the school year 1996-97 with similar results. The chi-square remained statistically significant at .05 but was extremely close with $p = .047$. The ratio of chi-square to degrees of freedom was 1.452. The TLI and CFI were

excellent values, .995 and .997 respectively. RMSEA was .060 with a confidence interval of 0.007 to 0.096. The standardized residual covariance matrix was symmetrical and centered on 0 with no residual exceeding 2.0. The SRMR was .036 and all parameter estimates were statistically significant. This replication provided strong support for the theoretical model fitting the data. A comparison of parameter estimates was made. The exogenous latent variables accounted for 68% and 75% of the variance in Academic Achievement for 1997-98 and 1996-97 respectively. The indicators of Graduation Percentage and Infant Mortality appear low but these indicators strengthened the model and were good indicators of Children's Environment (Little et al., 1999). Teenage Pregnancy and Single-headed Households were the strongest indicators of Children's Environment and performed similarly across the replications. The strongest indicator variable across both years was Student SES with the latent variable Economic Condition.

School Building Model: A second analysis was conducted using only variables aggregated at the school building level. The school building model fit the data well. The chi-square was statistically significant at the .05 level at .042. However, this was expected based on the sample size. The ratio of chi-square to degrees of freedom was 1.770. The TLI and CFI, .998 and .999 respectively, were close to unity. The RMSEA was .048 with a confidence interval of 0.009 to 0.079. The distribution of the standardized residual covariance matrix was symmetrical and centered on 0 with no residual exceeding 2.0 and the SRMR was .0277. All parameter estimates were statistically significant except the covariance between Economic Condition and School Dropout Rate. Similar to the School District Model, Economic Condition was the strongest predictor. These explanatory variables together accounted for 65% of the

variance in Academic Achievement. Census Location demonstrated a negative relationship with Academic Achievement suggesting that higher academic achievement is associated with denser, urban environments.

Discussion

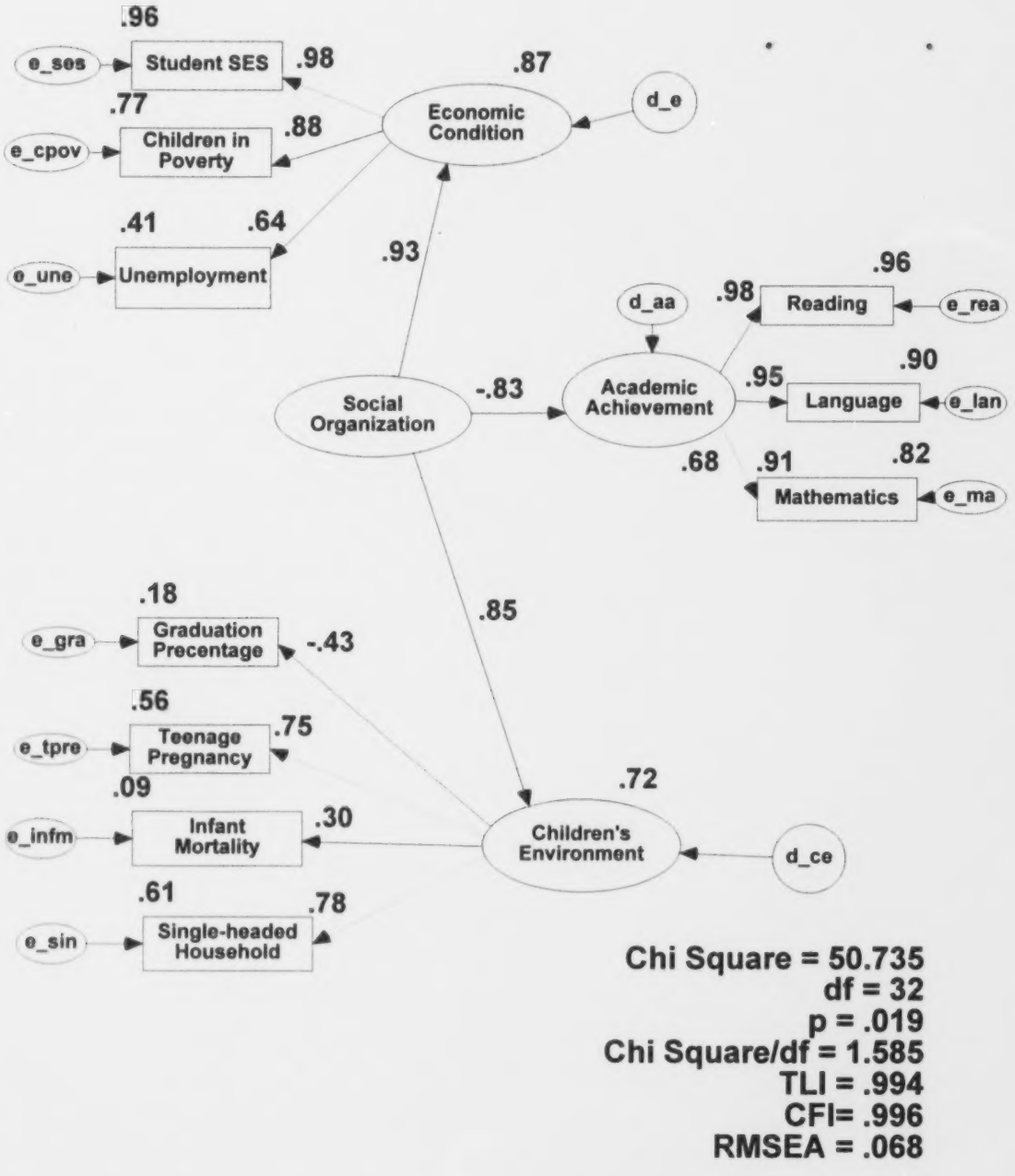
This investigation provided strong support for the hypothesis that community social disorganization theory explains a significant amount of variance in academic achievement as measured by standardized testing at both the school district and school building levels. Comparatively, Coleman et al. (1966) using the economical production function analyses accounted for 12% to 18% of the variance in academic achievement attributable to influences outside the school. Community variables of teenage pregnancy, infant mortality, single-headed households, and economic status suggested by Sampson (1997) and investigated by others demonstrated a strong, consistent relationship with academic achievement. The strongest throughout these analyses was students eligible for free and reduced lunch program at both the school district and school building levels. These schools and school districts with higher concentrations of students eligible for free and reduced lunch programs demonstrated lower academic achievement as measured by standardized tests. However, teenage pregnancy, infant mortality, and single-headed households cannot be discounted for their significant influences. These results support Grissmer et al. (1994) findings that scores of standardized tests had improved over the years based primarily on improved scores of those who were minorities or economically disadvantaged. Grissmer et al. (1994) reported that these improvements were a result of a host of social programs that were implemented.

Educational Policy Importance: Although the controversy surrounding academic achievement will not be resolved soon, it is clear that the first step to understanding the phenomena is to apply a comprehensive theory to guide all subsequent steps. This report's findings suggest using the community social disorganization theory at the macro-level to guide policy in improving academic achievement at the school district and school building levels.

Table 1. Variables' Sources, Means, and Standard Deviations

Variable	Source	1997-98		1996-97	
School District		M	SD	M	SD
Student SES	VDOE	.36	.15	.35	.15
Children in Poverty	Census Bureau	.18	.09	.18	.08
Unemployment	VA Employment Commission	5.11	2.71	5.02	2.52
Graduation Percentage	VDOE	75.76	9.35	76.42	8.77
Teenage Pregnancy	VDHHS	35.97	13.05	36.70	14.34
Infant Mortality	VDHHS	6.53	4.49	6.39	3.51
Single Headed Households	Census Bureau	.11	.04	.11	.04
Reading	VDOE	54.34	9.42	57.48	8.69
Language	VDOE	44.98	8.65	48.50	8.71
Mathematics	VDOE	47.19	11.06	49.25	10.72
School Building					
Economic Condition	VDOE	.61	.22		
School Dropout Rate	VDOE	.99	2.34		
Census Location	Census Bureau	4.83	2.10		
English/Writing	VDOE	827.56	40.49		
History	VDOE	369.17	24.52		
Mathematics	VDOE	400.91	25.53		
Science	VDOE	422.51	20.16		

Figure 1. 1997-98 School District Model



Chi Square = 50.735
df = 32
p = .019
Chi Square/df = 1.585
TLI = .994
CFI= .996
RMSEA = .068

Figure 2. 1996-97 School District Model

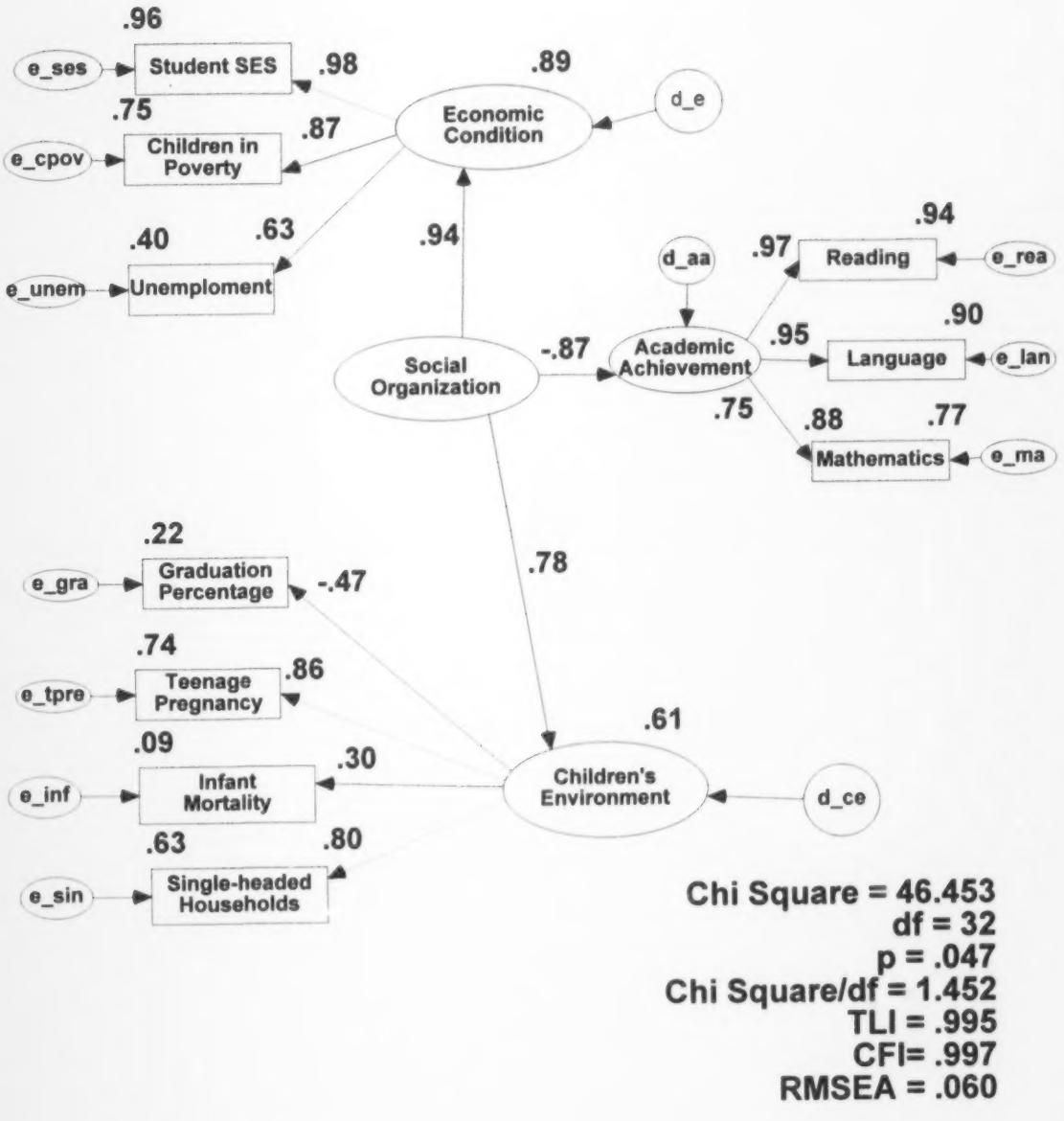


Table 2. Comparison of 1997-98 and 1996-97 School District Models – Standardized Path Coefficients

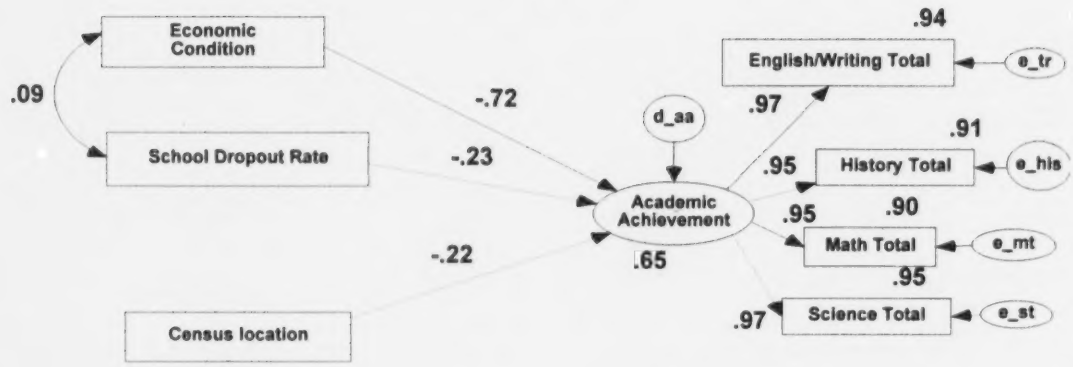
Variable	1997-98	1996-97
Independent		
Economic Condition*	.93	.94
Student SES		
Children in Poverty	.88	.87
Unemployment	.64	.63
Children's Environment*	.85	.78
Graduation Percentage	-.43	-.47
Teenage Pregnancy	.75	.86
Infant Mortality	.30	.30
Single-headed households	.78	.80
Social Organization*	-.83	-.87
Dependent Variable		
Academic Achievement*	.68*	.75*
Reading	.98	.97
Language	.95	.95
Mathematics	.91	.88

Note: All parameter estimates were statistically significant with $p < .01$. Latent variables and the amount of variance accounted for in academic achievement are identified with *.

Table 3. School District Model - Comparison of Standardized Total Effects

Predictor	Outcome Variables					
	Mathematics		Language		Reading	
	97-98	96-97	97-98	96-97	97-98	96-97
Social Organization	-0.75	-0.76	-0.78	-0.83	-0.81	-0.84

Figure 4. 1997-98 School Building Model



Chi square = 23.008
df = 13
p = .042
Chi square/df = 1.770
CFI = .999
TLI = .998
RMSEA = .048

Table 4. School Building Model Standardized Total Effects

Predictors	Outcome Variables			
	English Writing	Mathematics	Science	History
Dropout Rate	-.221	-.216	-.222	-.218
Census Location	-.216	-.211	-.218	-.213
Economic Condition	-.696	-.681	-.700	-.686

Table 5. 1997-98 School District Covariance Matrix

	1	2	3	4	5	6	7	8	9	10
1	0.001									
2	0.000	0.000								
3	0.000	0.000	0.000							
4	-0.001	-0.000	-0.000	0.012						
5	0.000	0.000	0.000	-0.000	0.000					
6	-0.059	-0.102	-0.098	0.247	-0.021	121.397				
7	-0.058	-0.077	-0.076	0.289	-0.017	81.743	74.173			
8	-0.066	-0.090	-0.084	0.283	-0.019	91.723	75.108	88.035		
9	0.000	0.000	0.000	-0.001	0.000	-0.174	-0.157	-0.176	0.001	
10	0.000	0.000	0.000	-0.002	0.000	-0.276	-0.259	-0.300	0.001	0.004

Note. 1 – Infant Mortality; 2 – Student SES; 3 – Unemployment; 4 – Graduation Percentage; 5 – Children in poverty; 6 – Mathematics; 7- Language; 8 – Reading; 9 – Teenage Pregnancy; 10 – Single-headed households

Table 6. 1996-97 School District Covariance Matrix

	1	2	3	4	5	6	7	8	9	10
1	0.000									
2	0.000	0.000								
3	0.000	0.000	0.000							
4	-0.000	-0.000	-0.000	0.012						
5	0.000	0.000	0.000	-0.000	0.000					
6	-0.034	-0.091	-0.084	0.348	-0.019	113.978				
7	-0.036	-0.084	-0.082	0.230	-0.018	78.053	75.178			
8	-0.034	-0.088	-0.076	0.269	-0.018	78.265	69.058	74.890		
9	0.000	0.000	0.000	-0.002	0.000	-0.201	-0.184	-0.192	0.001	
10	0.000	0.000	0.000	-0.002	0.000	-0.270	-0.243	-0.274	0.002	0.003

Note. 1 – Infant Mortality; 2 – Student SES; 3 – Unemployment; 4 – Graduation Percentage; 5 – Children in poverty; 6 – Mathematics; 7- Language; 8 – Reading; 9 – Teenage Pregnancy; 10 – Single-headed households

Table 7. School Model Covariance Matrix

	1	2	3	4	5	6	7
1	0.006						
2	-0.006	4.387					
3	0.001	-0.034	0.049				
4	-0.463	-8.105	-3.853	599.643			
5	-0.426	-5.710	-3.221	455.926	405.187		
6	-0.532	-10.563	-3.745	567.071	470.552	649.679	
7	-0.829	-13.938	-6.289	908.617	767.287	939.590	1634.678

Note. 1 – School Dropout Rate; 2 – Census Location; 3 – Economic Condition; 4 – History; 5 – Science; 6 – Mathematics; 7 – English and Writing Total Score

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